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NATIONAL AIR INTELLIGENCE CENTER

APPLIED OPTICS LABORATORY

by

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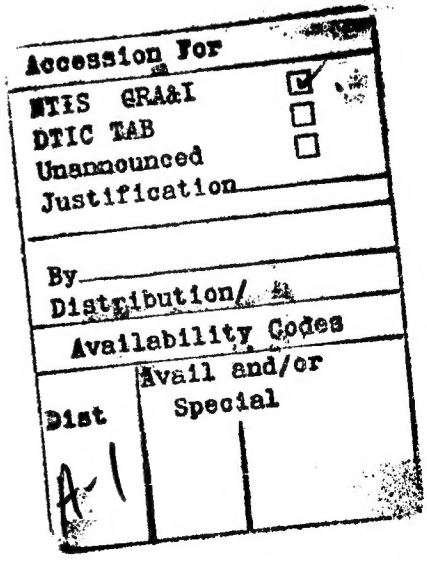

APPLIED OPTICS LABORATORY*

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A. Affiliate of: Changchun Institute of Optics and Fine Mechanics, Academy of Sciences of China

B. Directions and Main Contents of Research

The major directions of research of this lab will be transport, transformation, processing, receiving and display of information in modern optics, optical calculation and optical processing of non-optical signals. Main research contents include the following:

1. Optical design and image quality evaluation.
2. Optical super-fine processing and measurement technology.
3. Optical calculation technology.
4. Imaging spectral technology.
5. Color, vision and robot vision.
6. Optical information processing and holographic interference technology.
7. Short wave optical technology.

C. Scientific Significance and Application Potential of Research in this Field

Applied optics is mainly a discipline that studies and explores new applications and basic problems in the application based on principles and theory of optics. The emergence of lasers, optoelectronics and development of information science have broadened and enriched the scope

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* One of the state key labs.

** Numbers in margins indicate foreign pagination. Commas in numbers indicate decimals.

and contents of applied optics research. The combination and penetration of optics with such disciplines as computer technology, electronic technology and fine mechanics have also further changed the face of applied optics. It not only requires a lot of basic research in the combination of traditional applied optics with modern science, but also probing and developing new areas of optics and exploring new disciplines related to applied optics. For example, with the development of optical imaging technology, spectral technology, optical information processing and probing technology, imaging technology and spectral technology which were relatively independent in traditional optics have combined to become the new imaging spectral technology. Because of the increase of information it can obtain, imaging spectral technology has very wide application potential in remote sensoring technology, aerospace technology, search for and classification of military targets and medicine. As another example, with the progress in research of optical double steady state, space optical modulator, optical digital computation method and internal communication, optical computer may become a reality by the end of the century. Optical computers can fully take advantage of the fact that light has large information capacity, high speed, parallel calculation and processing to far surpass the capabilities of the current electronic computers. Its application potential in pattern recognition, picture processing, artificial intelligence and robotics is beyond imagination. Realization of optical computers, however, not only relies on progress of optics itself, but also has to do with such disciplines as computers, integrated optoelectronics, material science and information processing. Therefore, the basic research of applied optics should be stated early.

D. The domestic and Foreign State of the Art in this Field and the Level and Features of this Lab

The breakthrough in optical double steady state /368 technology in 1983 has given new driving power to progress in optical computers. The Optical Circuit Research Center and the SDI organization for cooperation in optical computation have been established in the United States and the Bell Laboratory has planned to manufacture the first optical computer in 1990. Japan and the Soviet Union have also taken steps to follow the U.S. closely.

The United States is currently leading in optical super-fine processing. Both the U.S. and Britain have machine tools with diamonds for cutting optical cells which can manufacture optical cells with face shape precision of 0.5 μm and 14th grade surface fineness for use in x-ray and near-infrared optical systems. The research in imaging spectral technology which started at the end of the 70's has now received widespread attention. The Jet Propulsion Laboratory of California Institute of Technology was the first to propose the plan for imaging spectral technology and it planned to finish a few sample machines by 1990.

Scholars in the United States, Japan, Britain, and Canada are currently studying transmission of color messages by human eyes, mechanism of color vision, activity of brain thinking and robot "human eyes".

Our institute was established in 1952 and was the first to be engaged in applied optics research in this country. In the past 30 years, this institute has done pioneering work in several fields of applied optics such as optical design, optical measurement, luminosity colorimetry, optical information processing, space remote-sensoring, target field

optical instruments and optical processing technology. More than 600 projects have been completed and 300 of these have won awards from the National Science Committee, Chinese Academy of Sciences, the Defense Science Committee, the state planning committee, National Science Conference and the Ministry, Provincial and Municipal government. Most finished projects are about or directly related to applied optics.

This lab has always had a close relationship with its counterparts in domestic universities. Many people from this lab have lectured in universities and carried out cooperative research with the universities. The establishment of the lab was partially supported by the universities.

This lab has established relationships with near 20 research labs in the United States, Britain, West Germany, France, and Japan. Foreign scientists were invited to lecture in this lab and researchers in this lab were sent abroad to do research. Joint research with foreign labs have also been successful. Nearly 50 papers have been published in international journals.

E. Short Term Research Emphasis

1. We mainly study intelligent specialist systems, software systems, design methods for non-conventional optical systems and special optical systems. We also study subjective and objective evaluation of optical systems' imaging quality.

2. Study of mechanism of super-fine processing for non-spherical, asymmetrical optical surfaces and study of

technology for real time measurement of dynamic and stationary Å scale fine change in size.

3. Exploration of overall layout of optical computer, study of optical switch and logic, computational methods and structures, internal connections, storage and space optical modulation, as well as technology for unified photoelectric computation.

4. Exploration of front-placed optical systems, new spectrometric methods, evaluation of detector performance, mounting technology and technology for data collection and processing.

5. Study of spectral radiometry, advanced colorimetry, color vision and robot vision.

6. Probing optical information processing and new progress in the field of holographic interference technology.

F. Size of the Lab

1. Researchers total 80-85 people. Of these, 20-25 people are permanent employees and the other 60 are visiting researchers.

2. There are 18 technicians including 2 management personnel.

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